Soft-Circuit LED Bracelet

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TOOLS:

- Needle (1)
- Needlenose pliers (1)
- Scissors (1)
- Sewing machine (1)

PARTS:

- Felt (1)
- Thread (1)
- Fabric (1)
  decorative outer fabric; optional
- Conductive thread (1)
- Conductive velcro (1)
  option A
- Purse snap (1)
  option B
- Sew-on snaps (1)
  option C
- Coin cell battery holder (1)
- Coin cell battery (1)
- LED (1)

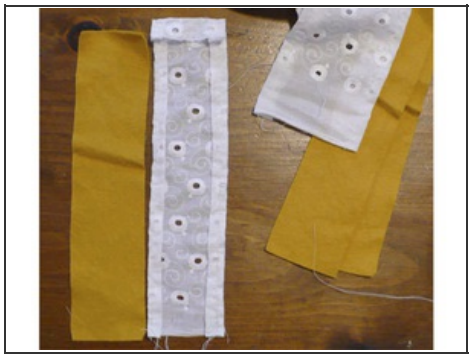
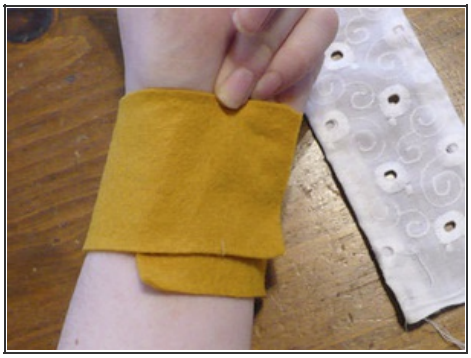
SUMMARY

Do you like crafting or sewing? Do you love LEDs? Well, why not combine your passions with this "wire-free" LED bracelet!

Have a little fun with conductive thread and "sewing" circuits and make a cool battery-powered LED cuff to wear out and about. It is only powered while you are wearing it because the fastener acts as a switch. No soldering/wiring required!

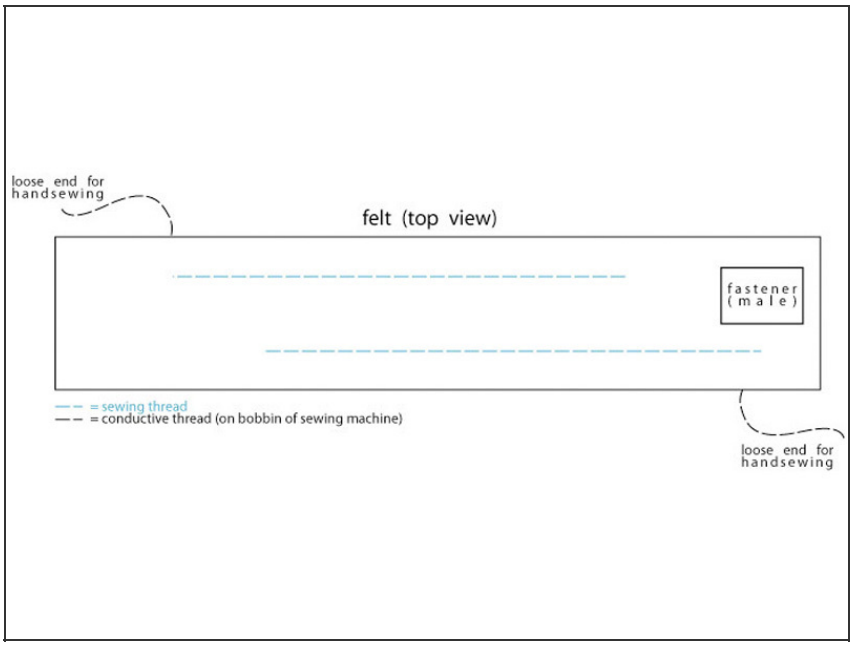
Many of the techniques shown in this tutorial were inspired by projects and materials links from Leah Buechley's E-Textile and DIY electronics research.

Step 1 — Gather materials and cut fabrics

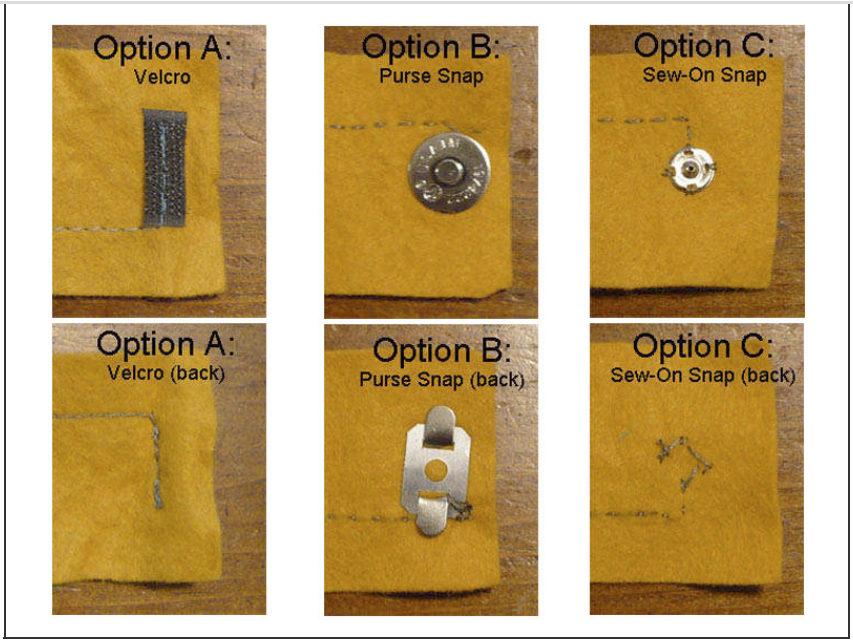
- Decide if you want to use conductive Velcro, magnetic purse snaps, or sewing snaps for your closure.
- Cut out a rectangle of each of your fabrics, felt for the lining and another fabric (or more felt) for your top layer. A 9" long strip makes a good cuff for average wrists. Try it out around your wrist to get a good length, and don't forget to leave some room for it to overlap when you attach your fastener (an inch or so will work).
- Use your sewing machine to hem any edges on your fabric if it looks like it will fray and make sure your fabric and felt strips are the same width.
- *If you will be making a lot of bracelets, create a template out of cardboard that you can trace.*

Step 2 — Sew power lines



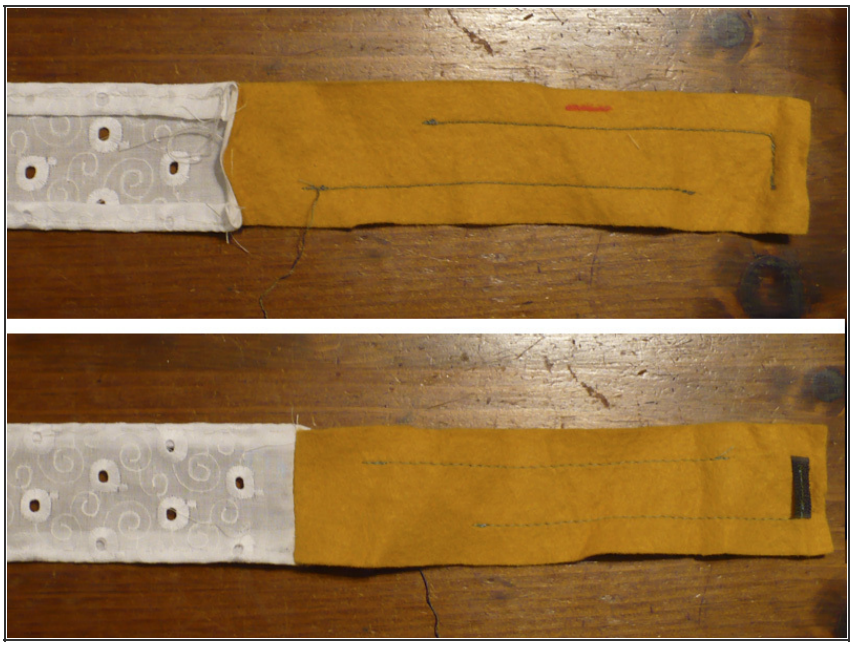
- Draw out two parallel lines on your felt. Stagger them a bit so there is an inch of space at each end that is not above/below the other. These will be your power and ground lines from the battery.
- With your sewing machine, wind a bobbin of conductive thread to use. Then with regular thread on the top and a conductive thread bobbin, sew along your lines. Leave enough conductive thread at either end for hand sewing, and trim the regular thread off.
- *You can also follow all of the sewing steps using ordinary hand-sewing techniques.*

Step 3 — Attach your fastener



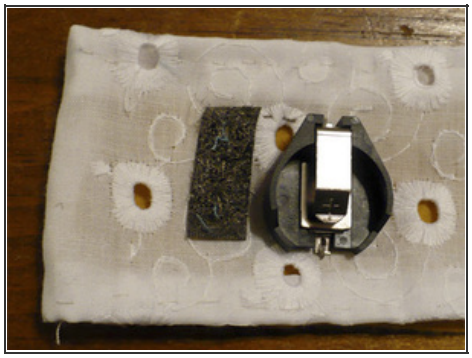
- Lay the felt out on a table with the conductive thread facing down. Using the extra thread on the right end of the felt strip, sew on your choice of fastener.
- For Velcro, cut a small strip of conductive Velcro and position underneath the end of the felt (as shown) and hand-sew. You can also sew the Velcro on when you are sewing the power lines (it is a bit tough to pin through, but will work in the machine). Make sure you loop a few times so that the thread and Velcro have a secure connection (for power purposes).
- For purse snaps, cut two small holes and push the "male" snap through. Slide the metal backing over the prongs. Use your conductive thread and loop a few times through the backing before you bend the prongs down (otherwise it will be hard to get the needle through if you bend first). As with the Velcro, make sure you have a strong connection.
- For sew-on snaps, position as with the Velcro and sew on with the conductive thread end. Make sure to loop two or three times through each hole in the snap to both hold it on and make a good connection.

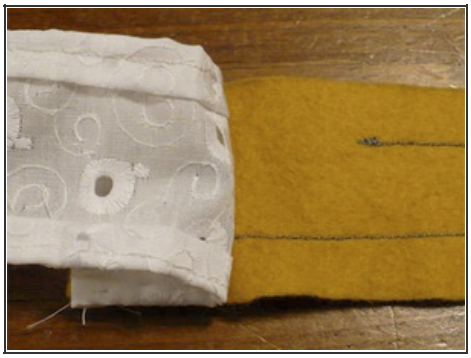
Step 4 — Sew fabrics together



- Now that you've got the basic "wiring" sewn, it is time to attach the top and bottom layers together. Line them up so that the fastener is facing down and the "top" of the top fabric is also facing down.
- Stitch the end opposite the fastener to your top layer (the end with the extra thread should be closest to the seam).
- *At this point you can also mark your "power" line with a pen or marker (it is the one attached to your fastener; in these pictures it is the top line).*

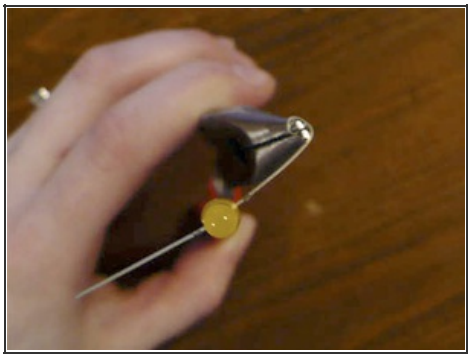
Step 5 — Attach the other fastener and battery holder





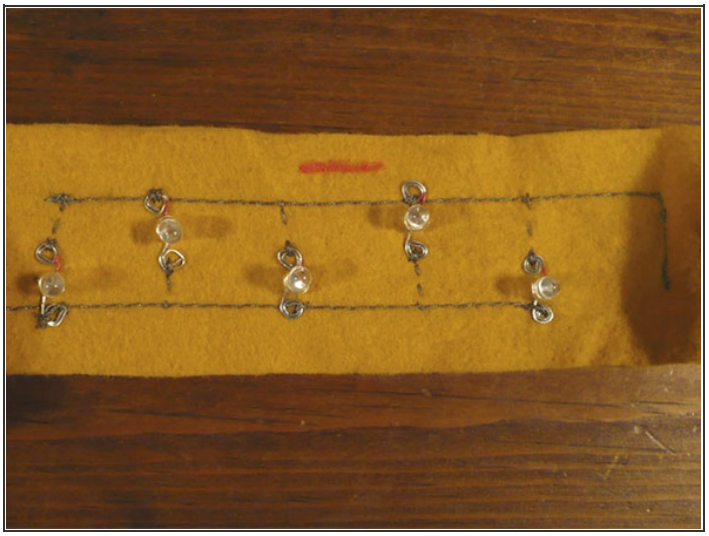
- Flip the fabrics so that they are facing each other (fastener facing out) and try it on - marking where you want the other fastener to be.
- Lay your bracelet out with the seam down and the top fabric on the right. Cut a length of conductive thread and sew your fastener to the top layer where you marked. Then sew a line along the top (about 1/4 inch) and sew through the top (+) loop of your battery holder.
- Once the battery holder and fastener are secured, flip the felt so that it is under the top fabric. Then take the extra conductive thread you left on the felt and thread it on a needle, pulling it through the top fabric and the bottom battery holder hole. Make sure to loop a few times through both layers of fabric to secure to the holder.

Step 6 — Ready your LEDs



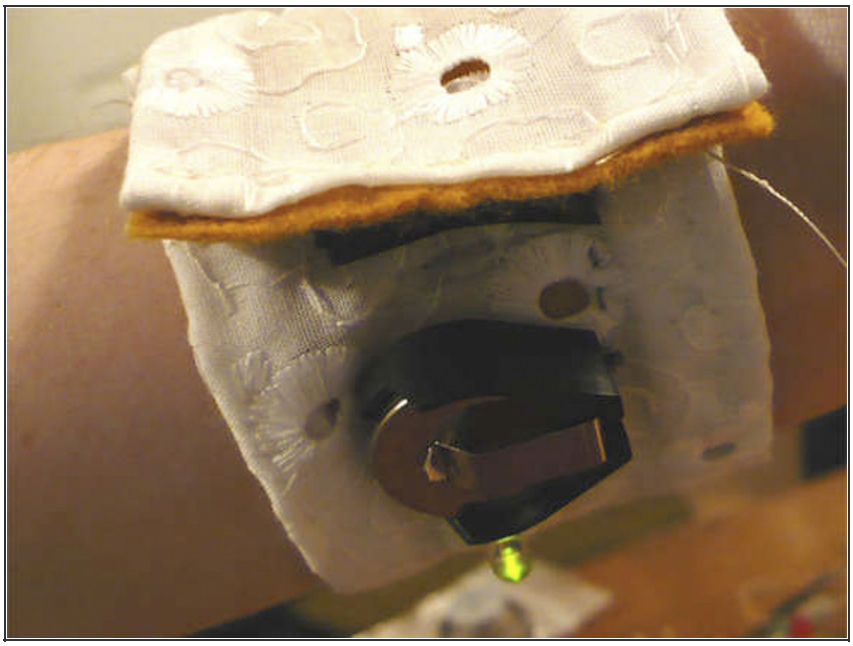
- Using your pliers, take an LED and bend the leads so that they are at a 90-degree angle - this will help the LED to lay flat against your fabric. Bend the leads so that they are facing opposite each other.
- Then grab a hold on the end of one lead and twist into a small loop. Spiral it around until you are almost all the way to the bulb (leave a little room at about the dent in the lead).
- Do this to both sides until you have what looks like a bead-type-object. You will be using the loops to sew the LED onto your fabric.
- *You can mark the "power" lead with a small dab of nail polish or paint to make it easier to identify which loop to sew to the power line. To help you identify which lead is power and which is ground: the anode (power or +) is the longer of the two and the cathode (ground or -) is the shorter and is on the side of the LED that is flattened (when viewing from above).*

Step 7 — Attach the LEDs



- Gather up your LED-beads and lay them out between your sewn lines (the power ends facing the power line). Take a bit of conductive thread and sew each end of the LED loops to each "power" and "ground" line (making sure not to let any of the thread cross between the two LED loops and short-circuit your bracelet). Trim all the ends of the thread as close as you can to the knots.
- When you are done sewing, use your scissors to cut holes for the LEDs to poke through your top fabric. Once the LEDs are placed to your liking, put your battery in the battery holder, connect the fasteners, and test it out! If all is well, sew the top fabric to the bottom fabric.
- And you are done! Wear your bracelet out and about and have fun. There are a ton of different variations you can make on the pattern, so experiment with different styles of fabrics and LEDs and maybe even make one to match your outfit...

Step 8 — Troubleshooting



- Some troubleshooting tips if things aren't lighting up: Check the battery to see if it is dead.
- Check your sewn connections to the LEDs to be sure you are making good contact with the power/ground lines to the LED loops.
- Check each LED to see if it is burnt out using alligator clips attaching the leads to a battery.

Related posts:

How-To: Make a Soft-Circuit LED bracelet

http://blog.makezine.com/archive/2008/02...

How-To: Make and Use Conductive Glue and Thread

http://blog.makezine.com/archive/2007/12...

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